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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/614,785	07/12/2000	Dong-Il Cho	00656	2551

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EXAMINER
HASSANZADEH, PARVIZ

ART UNIT	PAPER NUMBER
1763	17

DATE MAILED: 08/28/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/614,785	CHO, DONG-IL	
	Examiner	Art Unit	
	Parviz Hassanzadeh	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 July 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *8-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *8-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 8 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Patel et al (US Patent No. 6,290,864 B1) in view of Cannella (US Patent No. 4,889,609).

Patel et al teach a silicon etching apparatus (Fig. 1) using XeF_2 and a method of using the same, wherein the apparatus comprising:

a source chamber 11 containing XeF_2 (*a loading chamber for loading XeF_2*), an *expansion chamber* 12 for collecting XeF_2 gas from the source chamber 11, and an *etching chamber* 14 for performing an etching process on a sample; and

a first gas source 16 and a second gas source 18 in communication with the expansion chamber 12 for preparing a gas mixture with a ratio about 1:1 to about 500:1 to achieve greater etching selectivity and wherein the non-etchant gas source can be nitrogen (column 6, lines 10 through column 7, line14; column 8, lines 50-67; and Table in column 8).

Patel et al fail to explicitly teach a step of eliminating air moisture in the loading chamber, the expansion chamber or the etching chamber.

Cannella teaches a dry etching system (Fig. 1) wherein a load chamber 12, an unload chamber 16 and an etching chamber 14 are preferably purged with an inert gas and pumped down to or near a desired vacuum level in order to eliminate the ambient atmosphere and thus avoid contaminating the etching chamber 14 (column 11, line 56 through column 12, line 16).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the step of purging and pumping down the chambers as taught by Cannella in the operation of the system taught by Patel et al in order to eliminate the ambient atmosphere in the chambers and thus avoid contaminating the etching chamber.

Claims 8-10 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over McQuarrie et al (JP 10-317169 A) in view of Cannella (US Patent No. 4,889,609).

McQuarrie et al teach a silicon etching apparatus (Fig. 1) using XeF_2 and a method of using the same, wherein the apparatus comprising:

a source room 16 containing XeF_2 (*a loading chamber for loading XeF_2*), a tank 18 (*an expansion chamber)* for collecting XeF_2 gas from the source room 16, and an *etching chamber* 11 for performing an etching process on a wafer; and

an inactive (inert) support gas supply section 15 (*a means for injecting nitrogen*) that mixes with the etching gas before entering the etching chamber 11 (abstract and paragraphs 0001-0010).

McQuarrie et al fail to explicitly teach a step of eliminating air moisture in the loading chamber, the expansion chamber or the etching chamber.

Cannella teaches a dry etching system (Fig. 1) wherein a load chamber 12, an unload chamber 16 and an etching chamber 14 are preferably purged with an inert gas and pumped down to or near a desired vacuum level in order to eliminate the ambient atmosphere and thus avoid contaminating the etching chamber 14 (column 11, line 56 through column 12, line 16).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the step of purging and pumping down the chambers as taught by Cannella in the operation of the system taught by McQuarrie et al in order to eliminate the ambient atmosphere in the chambers and thus avoid contaminating the etching chamber.

Regarding claims 9, 13: The apparatus of McQuarrie et al also including a showerhead as shown in Fig. 1 for uniform distribution of the etchant gas (*XeF_2 gas is injected on the surface of wafer with a viscous laminar downflow using an injector having a predefined shape provided in the etching chamber*).

Regarding claims10, 14: The apparatus of McQuarrie et al also including pressure sources 21 and 22 which are in communication with the source room 16 and tank 18 via a series of valves (*controlling internal pressure of the loading chamber*) in order to maintain a constant pressure within the source room 16 and the tank 18 (paragraph 0011).

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Patel et al (US Patent No. 6,290,864 B1) in view of Sinha et al (US Patent No. 6,123,765).

Patel et al teach all limitations of the claim as discussed above except for measuring the weight of XeF_2 in the loading chamber.

Sinha et al teach deposition apparatus including a gas delivery system 10 wherein a weight scale 24 is used to monitor the weight of the liquid chemical in a bubbler chamber 13.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the weight scale as taught by Sinha et al in the apparatus of Patel et al in order to monitor the weight of the xenon difluoride in the load chamber.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over McQuarrie et al (JP 10-317169 A) in view of Sinha et al (US Patent No. 6,123,765).

McQuarrie et al teach all limitations of the claim as discussed above except for measuring the weight of XeF_2 in the loading chamber.

Sinha et al teach deposition apparatus including a gas delivery system 10 wherein a weight scale 24 is used to monitor the weight of the liquid chemical in a bubbler chamber 13.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the weight scale as taught by Sinha et al in the apparatus of McQuarrie et al in order to monitor the weight of the xenon difluoride in the load chamber.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Imai et al (US Patent No. 5,716,494) teach an etching apparatus including a gas distribution injector;

Chen et al (US Patent No. 4,478,677), Winter (US Patent No. 4,190,488) and Matsui et al (JP 61-134019 A) disclose conventional silicon etching apparatus using xenon difluoride;

Nakagi et al (JP10-209088 A) and Matsui et al (JP 61-181131 A) disclose silicon etching apparatus wherein an inert carrier gas such as nitrogen is used to carry an etchant XeF_2 gas to an etching chamber; and

McQuarrie et al (US Patent No. 6,409,876 B1) teach a dry etching apparatus including a loading chamber, and expansion chamber and an etching chamber.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Parviz Hassanzadeh whose telephone number is (703)308-2050. The examiner can normally be reached on Tuesday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on (703)308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703)872-9310 for regular communications and (703)872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0661.

P. Hassanzadeh

Parviz Hassanzadeh
Examiner
Art Unit 1763

August 16, 2002